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# Finding *Galictis cuja* (Molina, 1782) (Carnivora, Mustelidae) at a northern Chilean site in the potential distribution area of the species

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**Abstract.** According to current literature, *Galictis cuja* (Molina, 1782) does not inhabit the desert of Chile. However, a previous ecological niche analysis had indicated a high probability of the mustelid Quique's occurrence in the ravines that cross the northern desert of Chile. We present the first finding of *Galictis cuja* in the northern desert of Tarapaca region, Chile, apparently attacked and killed by dogs, which indicates an expansion of its distribution range and the utilization of microhabitats.

**Key words.** Atacama Desert, dog predation, mustelid, new records, Quique

**Valladares-Faúndez P, Canepa F, Rubilar CR, Álvarez-Henríquez A** (2025) Finding *Galictis cuja* (Molina, 1782) (Carnivora, Mustelidae) at a northern Chilean site in the potential distribution area of the species. Check List 21 (1): 81–86. https://doi.org/10.15560/21.1.81

## INTRODUCTION

*Galictis cuja* (Molina, 1782), Lesser Grison or Quique, is a mustelid with a wide distribution in South America. It has been recorded in southern Peru (Pearson 1951; Grimwood 1969; Cossíos et al. 2012), western Bolivia (Yensen et al. 1994; Anderson 1997), central and southern Chile (Ebensperger et al. 1991; Iriarte 2021), Paraguay, Uruguay, Argentina, and southeastern Brazil (Yensen and Tarifa 2003; Borndholdt et al. 2013). *Galictis cuja* occurs at elevations ranging from sea level to 4200 m (Nabte et al. 2009) and occupies various habitats, including the Atlantic Forest (Rocha-Mendes et al. 2010), cold steppe in Patagonia (Prevosti and Travaini 2005), Mediterranean steppe (Pine et al. 1979), and exotic forest plantations in Chile (Zúñiga et al. 2009).

The presence of *G. cuja* in south-central Chile is unquestionable. However, its presence in northern Chile has been controversial. Philippi et al. (1944) collected a specimen in January 1940 in the town of Putre during an ornithological expedition. Subsequently, Pine et al. (1979) mentioned indirect records from Tignamar, Belen, and Putre, based on burrows, footprints, and feces. These records were later validated by the Ministerio de Medio Ambiente of Chile (MMA 2019), but no additional data were provided. The MMA document also indicated this species' presence in the Quebrada de Camarones (Arica and Parinacota region), but information such as geographic coordinates, photographs, environmental context, observation dates, and another data are lacking.

Poo-Muñoz et al. (2014) modeled the ecological niche of *G. cuja* by incorporating various climatic variables and identified potential areas of distribution for this species, including desertic areas within the Tarapaca region. In this report, we present the first documented record of *G. cuja* from the desert of the Tarapaca region, Chile.

OPEN ACCESS

**Academic editor:** Gisela Sobral
**Received:** 11 September 2023
**Accepted:** 25 January 2024
**Published:** 16 January 2025

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## METHODS

This work is part of our research project "Inventory of Terrestrial Vertebrates in Northern Chile" at the Universidad de Tarapacá, where we maintain a reference collection of vertebrates of northern Chile. One of our primary methods of inquiry involves establishing close communication with local farmers and residents in towns and cities who provide us information about vertebrates through observations, photographs, and by reporting deceased animals. The Quebrada de Tana is one of these locations from which we consistently receive information, and this has enabled us to compile a preliminary species inventory. This area is primarily characterized by the cultivation of alfalfa by a small community of farmers who rely on this resource

**Figure 1.** The landscape of Quebrada de Tana, Tarapaca region, Chile, in the middle of the Atacama Desert. Alfalfa fields are next to a river.

(Figure 1).

A deceased individual of a mustelid was discovered in the alfalfa fields by Mr. Claudio Vélez Silva, who brought the specimen to the Laboratory of Integrative Zoology (Figure 2). The taxonomic identification of this specimen as *Galictis cuja* was based on Yensen and Tarifa (2003) and Bornholdt et al. (2013). We performed an autopsy to determine the cause of death. The skull was preserved for scientific documentation, and the fur was successfully dried and taxidermized, despite the challenges posed by the advanced state of decomposition of the specimen. Hair samples were collected and stored for future analysis. The specimen was cataloged with a unique code within the Zoological Collection of Arid and High-Andean Zones of the Universidad de Tarapacá (CZZA-UTA).

## RESULTS

**New record** (Figure 3). CHILE – Tarapaca region • Quebrada de Tana; 19°26′20″S, 069°54′55″W; 523 m elev.; 22.VII.2023; Claudio Vélez Silva leg.; sex indet.; CZZA-UTA 375.

**Identification.** Based on the body shape and fur characteristic, we confirm that the specimen is *G. cuja*. It exhibits the following characteristics: elongate body with a long neck, narrow chest, short legs, and a small, flat head with short, broad, rounded ears. The face, throat, ventral area, and front legs are black. A diagonal stripe of beige or dark yellow runs from the forehead to the shoulder, extending to the back, and separating the dorsal from the ventral area, clearly delineating the upper from the lower part of the animal. The fur is coarse, but the undercoat is soft and short. Vibrissae and the nose pad are black (Figure 2).

The skull of *G. cuja* is characterized by being elongated and flattened (Figure 4A, B), with cranial sutures

**Figure 2.** Adult *Galictis cuja* found dead in Quebrada de Tana, Tarapacá region, Chile (CZZA-UTA 375).

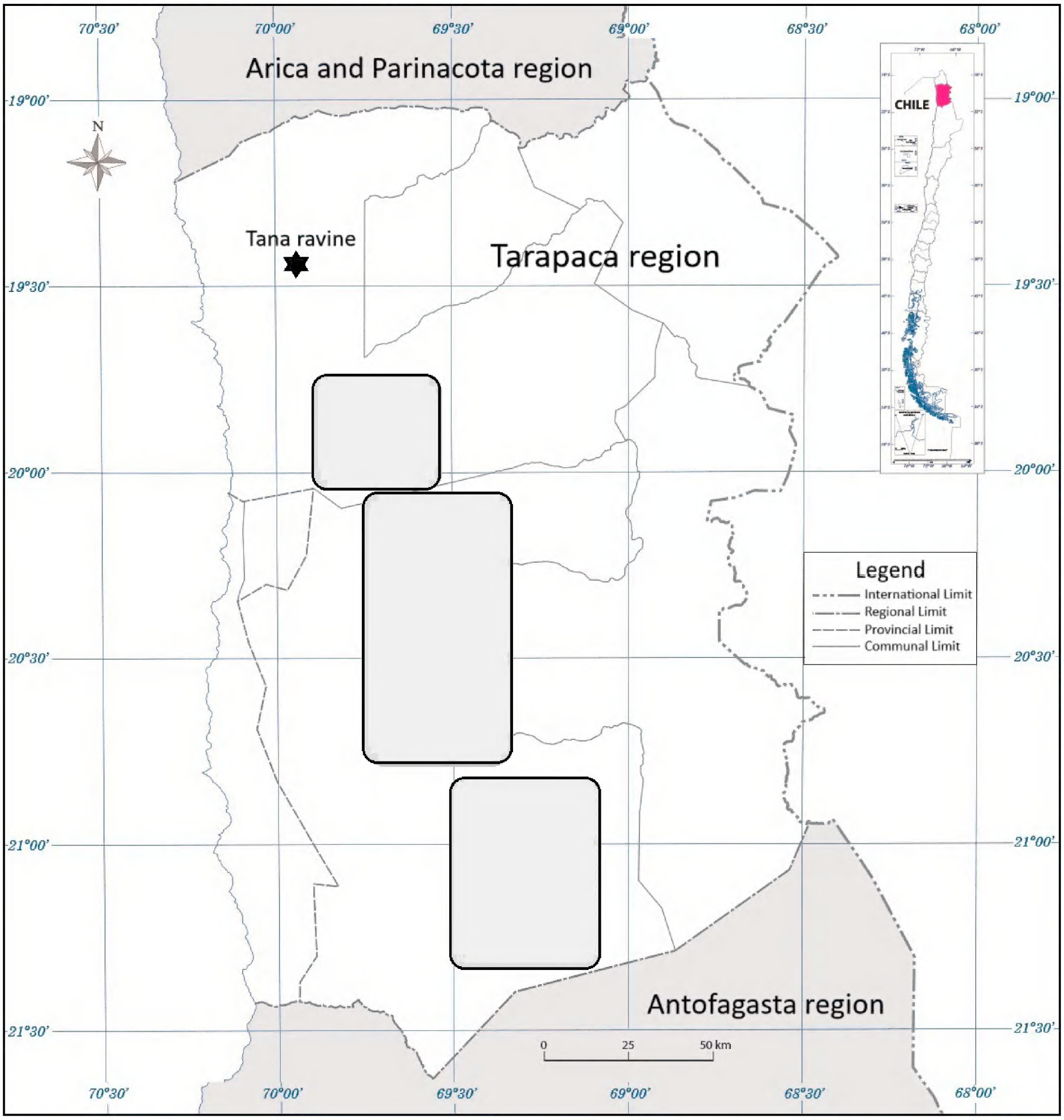


**Figure 3.** Distribution of *Galictis cuja* in the Tarapacá region, Chile (star). Gray rectangles represent areas where *G, cuja* could potentially inhabit according to Poo-Muñoz et al. (2014).

diffuse and barely identifiable, particularly the mentonian suture. This peculiarity of the skull hinders the clear identification of other bones. The rostral portion is relatively short, the nasal bone is small, and there is a large nasal opening in relation to the size of the bone. The sagittal and nuchal crests are projected and clearly visible. The cranial box is large, flat, and V-shaped. The postorbital processes are pronounced and pointed, as is the frontal process of the zygomatic bone. The zygomatic arches are not highly projected to the sides, and the infraorbital foramen is irregular and small. The tympanic bullae are entirely flattened, appearing triangular when viewed from an inferior plane. The foramen magnum is oval and has a prominent occipital condyle demarcating it. The incisive foramen is very small compared to the rest of the skull, and the pterygoid process is quite projected. The mandible is flat, relatively short, and markedly V-shape. The mandibular condyle is highly specialized, resembling a roller, allowing it to fit into the mandibular fossa of the frontal bone like a true hinge. This specialized structure restricts the mandible to vertical movements only, a characteristic observed in few carnivores. The mandibular ramus is long, and the coronoid process is slightly pointed, with the angular process well developed and dorsally projecting. The masseteric fossa is easily distinguishable from the rest of the mandible. Our specimen should have had 34 teeth, but it lacks

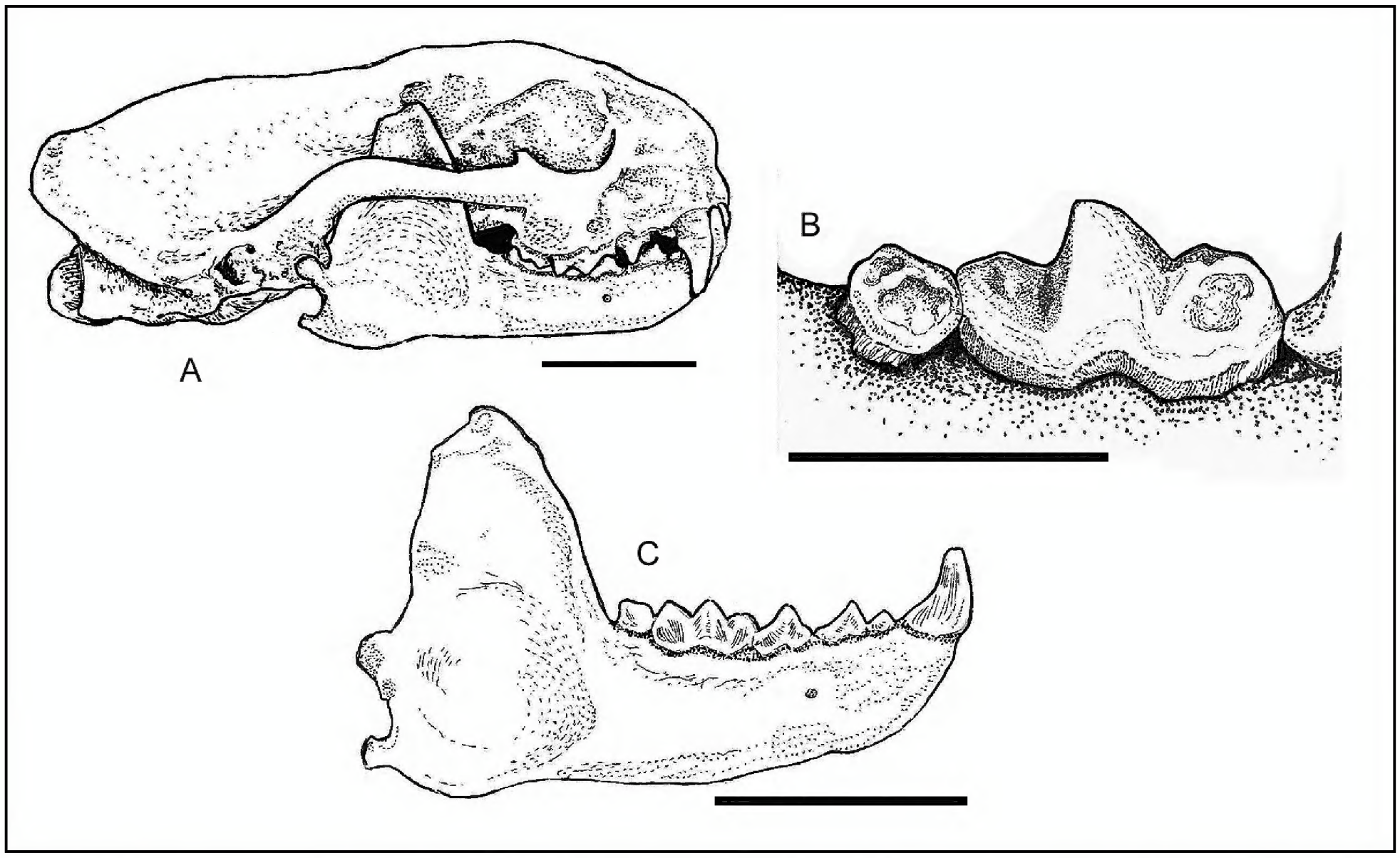


**Figure 4.** Skull of *Galictis cuja* specimen (CZZA-UTA 375). **A.** In lateral view. **B.** Absence of metaconid in the first molar of specimen (compare with Bornholdt et al. 2013: figure 1). **C.** Mandile in lateral view. Scale bars: A, B = 1 cm; C = 0.5 cm.

the lower right second molar. There are no metacanids present (Fig. 4C), which confirms that this individual is *G. cuja*. It has supernumerary incisors, and the other dental pieces are characterized by being pointed, sharp, and may have triple roots.

The standard measurements of the skull and selected body dimensions are shown in Table 1. The sex of the individual could not be determined due to the absence of the hind limbs, pelvic area, and tail. However, the measurements of the skull suggest that the animal might be a male (compare with Bornholdt et al. 2013).

**Table 1.** Descriptive statistics (mean, standard deviation, and range) of *Galictis cuja* (from Bornholdt et al. 1999) and the specimen found in Quebrada de Tana, Tarapaca region, Chile (CZZA-UTA 375).

| Morphological character | Mean, standard deviation, and range (Bornholdt et al. 1999) | | CZZA-UTA 375 |
|---|---|---|---|
| | Male | Female | |
| GLS, greatest length of skull; | 76.28 ± 4.03 (64.93–83.52) | 69.50 ± 3.49 (63.40–77.14) | 79.1 |
| NL, nasal length | 21.45 ± 1.76 (17.20–26.47) | 19.83 ± 1.36 (17.40–23.63) | 21.9 |
| ZB, zygomatic breadth | 43.02 ± 3.12 (35.0–50.09) | 39.21 ± 2.18 (34.16–44.04) | 44.3 |
| MB, mastoid breadth | 39.76 ± 2.75 (32.52–46.83) | 35.62 ± 2.33 (31.28–41.74) | 38.2 |
| BB, braincase breadth | 34.68 ± 1.83 (30.34–37.98) | 33.10 ± 1.54 (29.70–36.51) | 35.8 |
| IC, interorbital constriction | 16.55 ± 1.30 (13.20–19.50) | 15.26 ± 1.21 (13.0–18.17) | 19.9 |
| PC, postorbital constriction | 17.72 ± 1.33 (14.39–21.66) | 16.83 ± 1.40 (12.96–19.76) | 16.4 |
| PW, palatal width | 11.68 ± 0.96 (9.51–13.50) | 11.07 ± 0.87 (9.62–12.73) | 12.2 |
| BH, braincase height | 25.43 ± 1.69 (21.91–28.94) | 23.17 ± 2.08 (18.67–29.35) | 25.3 |
| MAL, mandible length | 44.79 ± 2.98 (36.73–51.70) | 40.32 ± 2.22 (36.02–45.35) | 47.8 |
| MH, mandible height | 21.80 ± 1.84 (17.16–25.99) | 19.05 ± 1.58 (16.02–22.77) | 23.8 |
| C-M2, length of maxillary toothrow | 20.98 ± 1.50 (17.22–27.96) | 19.08 ± 1.66 (16.20–25.90) | 21.2 |
| C-C, external alveolar distance between upper canines | 16.75 ± 1.41 (13.30–21.49) | 14.91 ± 1.29 (12.30–17.91) | 17.3 |
| M2-M2, external alveolar distance between upper molars | 23.97 ± 1.64 (20.02–27.91) | 21.90 ± 1.55 (19.64–27.55) | 24.1 |
| c-m2, length of mandible toothrow | 26.14 ± 1.52 (21.71–29.18) | 23.74 ± 1.56 (20.0–27.40) | 27.1 |

## DISCUSSION

The distribution of *Galictis cuja* in northern Chile, along with that of other mammalian species, reveals a significant information gap, especially in the northern Chilean desert. Nonetheless, there have been several recent discoveries of previously unknown species in ravines, such as Quebrada de Camarones and Quebrada de Tana (Valladares et al. 2020; Quiroga-Carmona et al. 2023). This holds true for *G. cuja*, for which there were, until now, no reliable physical records of its presence in the Tarapaca region, Chile.

The occurrence of *G. cuja* in the Quebrada de Tana was not unexpected, as this area had been previously identified as potentially being occupied by this species by Poo-Muñoz et al. (2014) (Figure 3), particularly in some ravines that cross the desert of the Tarapaca. It is highly important to intensify the exploration and collection efforts of vertebrate species inhabiting such areas.

According to Mr. Vélez, it is possible that the *G. cuja* species had been attacked by domestic dogs. Indeed, our necropsy of the animal reveals deep wounds and tears, both on the neck and chest. The back of the body is severed, and there are no hind limbs or tail. This situation is not unique, as we recently seen another animal corpse in a similar condition (a wild montane Guinea Pig, *Cavia tschudii* (Fitzinger, 1867), hunted by domestic dogs; 26 August 2023, adult male, CZZA-UTA 386). There are also documented records of the predation of guinea pigs by domestic cats in the same locality (Valladares et al. 2020; CZZA-UTA 11002, CZZA-UTA 11005). The ravines crossing the Atacama Desert are rich in invasive exotic species, with many dogs and cats, and a highly dense population of rats (*Rattus* sp.). These pose a significant threat to native wildlife in the region.

## ACKNOWLEDGEMENTS

We thank Mr. Claudio Vélez for donating biological material to the Laboratory of Integrative Zoology at the Universidad de Tarapaca, Chile. This publication has been funded by the UTA Mayor 4731-24 project of the University of Tarapaca.

## ADDITIONAL INFORMATION

The authors declare that no competing interests exist.

### Ethical statement

No ethical statement is reported.

### Funding

This work was financed in part by grant UTA Mayor 4725/21 from the Universidad de Tarapacá.

### Author contributions

Conceptualization: PVF. Data curation: CRO, FC, NAH. Funding acquisition: PVF. Investigation: PVF, CRO, FC, NAH. Methodology: PVF, NAH CRO. Project administration: PVF, NAH. Supervision: PVF. Visualization: FC. Writing–original draft: PVF, CRO. Writing – review and editing: NAH, FC, CRO.

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### Data availability

All data that support the findings of this study are available in the main text.

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